# LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Feb. 4- 8, 2008.

**AAAS spotlights NIF, fusion energy at annual gathering**


The National Ignition Facility, which will be completed in 2009, is the world's most energetic laser. Fusion experimentation will begin in 2010.

Lawrence Livermore National Laboratory's National Ignition Facility (NIF) will be highlighted at the annual meeting of the American Association for the Advancement of Science in Boston, Feb. 15-18.

A three-hour symposium, on Feb. 16, entitled "High-Powered Lasers: Fusion Ignition and Concomitant Scientific Opportunities, will look at how the output of lasers has grown from millijoules to megajoules and from milliwatts to petawatts. Leading this evolution is NIF, which already is the world's most energetic laser, even though completion of the facility is not scheduled until 2009.

Guest speakers and their presentations include:

National Ignition Facility: Ushering in a New Era for Experimental Science, by Edward Moses, Principal Director of the National Ignition Facility and Photon Science at LLNL.

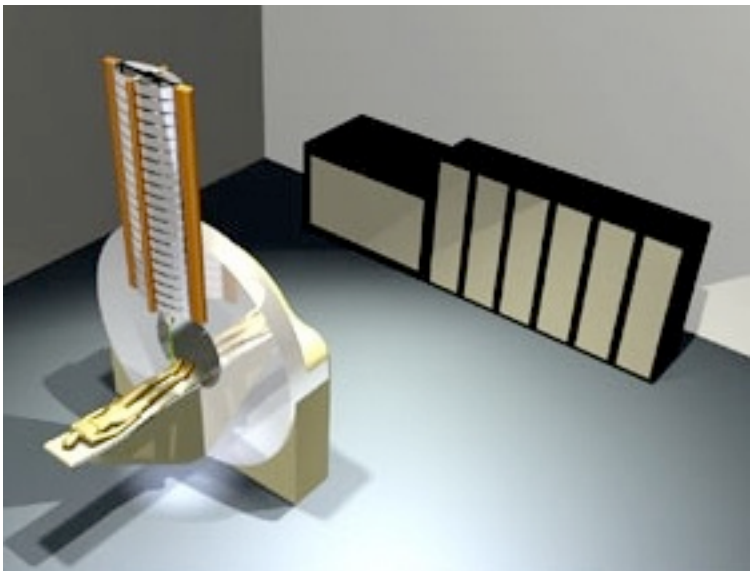
Basics of Inertial Confinement Fusion, by John Lindl, LLNL physicist.

Also that day, LLNL's David K. Smith will take part in a symposium entitled, "Atomic Detectives: Nuclear Forensics and Combating Illicit Trafficking." Smith will discuss "Tools to Detect Undeclared Nuclear Activities."

LLNL's Principal Associate Director for Science and Technology Cherry Murray is the moderator and one of the organizers for "50 Years of the Space Age: Looking Back, Looking Forward." The symposium will be held Feb. 15.

For information, see AAAS: <http://www.aaas.org/meetings/> http://www.aaas.org/meetings/>

**Livermore wins two Federal Lab Consortium awards for tech transfer**



Laboratory researchers have been selected to receive two awards for excellence in technology transfer by the Federal Laboratory Consortium. LLNL's two awards this year make it one of six research laboratories to garner multiple honors, among the more than 250 federal government laboratories and research centers that comprise the consortium.

This year's awards will be presented May 8 during the Federal Laboratory Consortium's four-day national technology transfer meeting in Portland, Ore. Started in 1974, the consortium assists the U.S. public and private sectors in utilizing technologies developed by federal government research laboratories.

Livermore won its two awards for developing the first compact proton therapy system for treating cancer patients and for developing the first portable neutron detector, which can assist in interdicting illegal nuclear materials. Both of the Laboratory's awards originated from defense-related research that was funded by the National Nuclear Security Administration of the U.S. Department of Energy.

Proton therapy is considered the most advanced form of radiation therapy available, but size and cost have limited the technology's use to only six centers in the United States and 25 worldwide. The compact proton therapy system would fit in any major cancer center and cost about one-fifth as much as a full-scale machine.

The Fission Meter is the first portable neutron detector that can distinguish between a fissile and non-fissile neutron source in real time. This detector provides "proof positive" identification of fissile neutron sources, such as uranium and plutonium, and it can differentiate between weapons-usable materials and other items. As a result, the detector's speed and accuracy reduce the need for intrusive inspections, and minimize the impact on commerce.

For more information, see the press release at < https://publicaffairs.llnl.gov/news/news_releases/2008/NR-08-02-01.html >

**Messenger carries technology germane to homeland security**

Call it serendipity. Call it ingenuity. When researchers from Lawrence Livermore and Lawrence Berkeley national laboratories were tasked with building a gamma ray spectrometer for NASA's Mercury MESSENGER, they didn't necessarily know that they could turn to an existing homeland security instrument to help them out.

In 2001, LLNL teamed with LBNL to design a germanium-based gamma ray spectrometer to be installed on the NASA Mercury MESSENGER (short for Mercury Surface, Space Environment, Geochemistry and Ranging) spacecraft, where the apparatus will be used to help identify the mineral make-up of the surface composition.

The trick was to build an instrument that could withstand the extreme heat radiating from Mercury's surface. Because the planet is so close to the sun and has an energy output equivalent to 11 suns as seen from Earth, Mercury can reach as high as 400 degrees Celsius (752 degrees Fahrenheit). In order for the germanium-based spectrometer to operate correctly, the crystal has to be cooled to -200 degrees Celsius.

How to accomplish that? That,s where LLNL scientists come in. The technology recently enabled MESSENGER to beam back some surprising new data from Mercury.

For the story:
< https://newsline.llnl.gov/articles/2008/feb/02.01.08.php>
For the NASA images
< http://science.nasa.gov/headlines/y2008/30jan_mercurysurprise.htm?list213789 >

**Latest findings on foot-and-mouth disease in *Journal of Clinical Microbiology***

Journal of Clinical Microbiology

Laboratory scientists, in collaboration with researchers at other institutions, present their findings on a new assay developed for the differential laboratory diagnosis of foot-and-mouth disease virus (FMDV). The article is scheduled to appear in print within the American Society for Microbiology's *Journal of Clinical Microbiology* in the March '08 issue. The article reports that the multiplexed assay simultaneously screens for five RNA and two DNA viruses.

See the online preview at <http://jcm.asm.org/cgi/content/abstract/JCM.01740-07v1> http://jcm.asm.org/cgi/content/abstract/JCM.01740-07v1

**Lab honors its R&D 100 winners**


The Laboratory honored its R&D 100 award winners for 2007, a list that includes more than two dozen Lab scientists and engineers working on five awards. Steve Liedle, the Laboratory's deputy director, and Camille Yuan-Soo Hoo, the National Nuclear Security Administration's Livermore Site Office manager, presented the awards.

The Laboratory won five R&D 100 awards in 2007 for developing advances among the top 100 industrial inventions worldwide. LLNL has won 118 such awards since 1978. The award-winning technologies are:

The Micro Electro Mechanical System (MEMS)-based Adaptive Optics Scanning Laser Ophthalmoscope. This instrument, developed in conjunction with six universities and an industrial partner, will enable clinicians to image and measure microscopic structures of the living eye.

A Noninvasive Pneumothorax Detector. This new device detects pneumothorax, a medical condition caused by having air trapped in the space between the wall of the chest cavity and the lung.

Continuous Phase Plate Optics, an important breakthrough for the Laboratory,s National Ignition Facility that allows the laser’s 192 beams to be optimally coupled to its targets. The award is shared with two optics companies.

Large Area Imager, an advanced system for detecting and interdicting illegal nuclear materials. The instrument was developed in collaboration with Oak Ridge National Laboratory and the UC Berkeley Space Sciences Laboratory.

Hypre software library that allows researchers to more effectively use supercomputers such as BlueGene/L and ASC Purple to conduct large, more detailed simulations faster than ever before.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy,s National Nuclear Security Administration. LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions,

universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail < mailto:labreport@llnl.gov>.

**********

Susan Houghton
Director of Public Affairs
Lawrence Livermore National Laboratory
P.O. Box 808, L-797
Livermore, Calif. 94551
Email: houghton3@llnl.gov
Phone: 925-422-9919, Fax: 925-422-8554